Fig.1

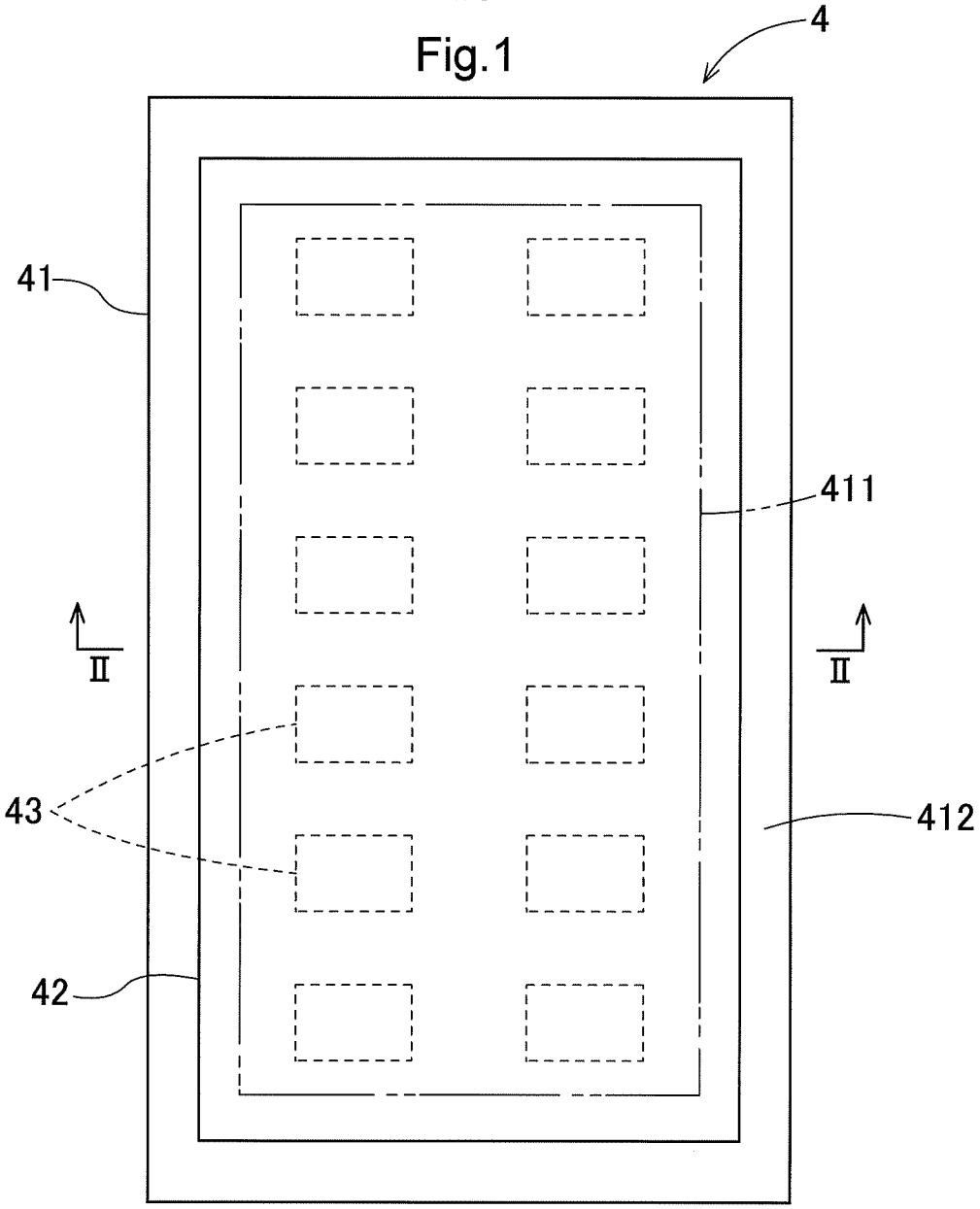


Fig.2

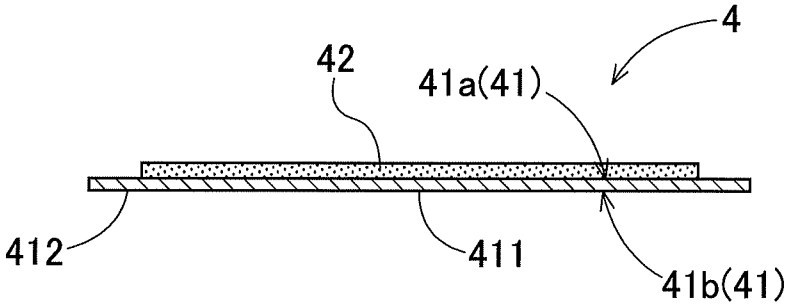


Fig.3

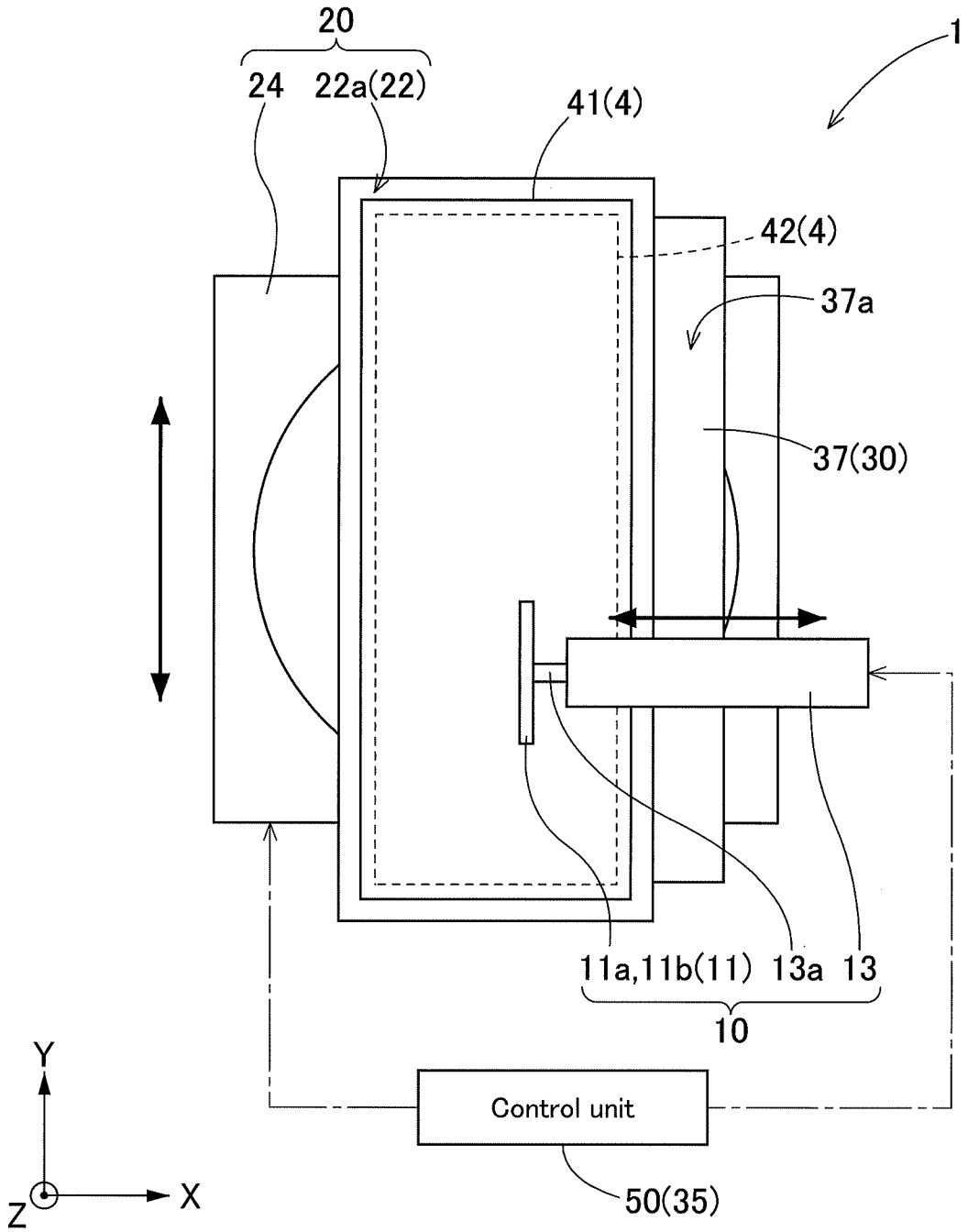

20
24
22a(22)
41(4)
1
42(4)
37a
37(30)
11a,11b(11)
13a
13
10
Control unit
50(35)
Y
X
Z

Fig.4

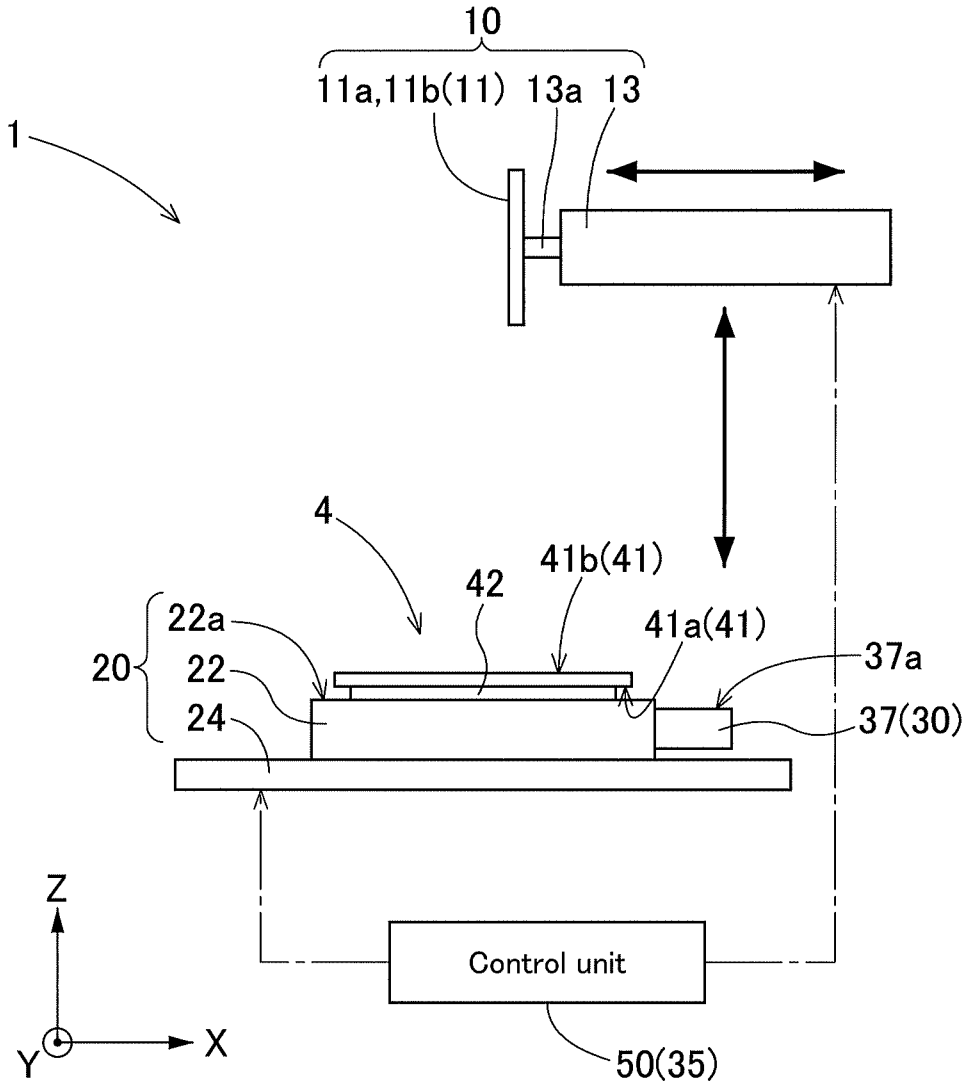

10
11a,11b(11)
13a
13
1
4
41b(41)
42
22a
41a(41)
37a
20
22
24
37(30)
Z
Control unit
Y
X
50(35)

Fig.5A

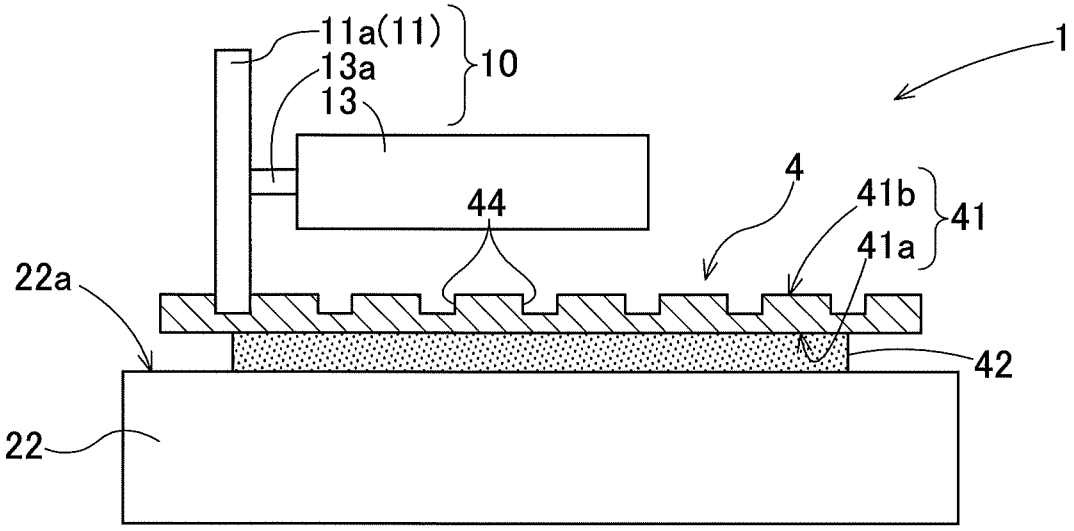


Fig.5B

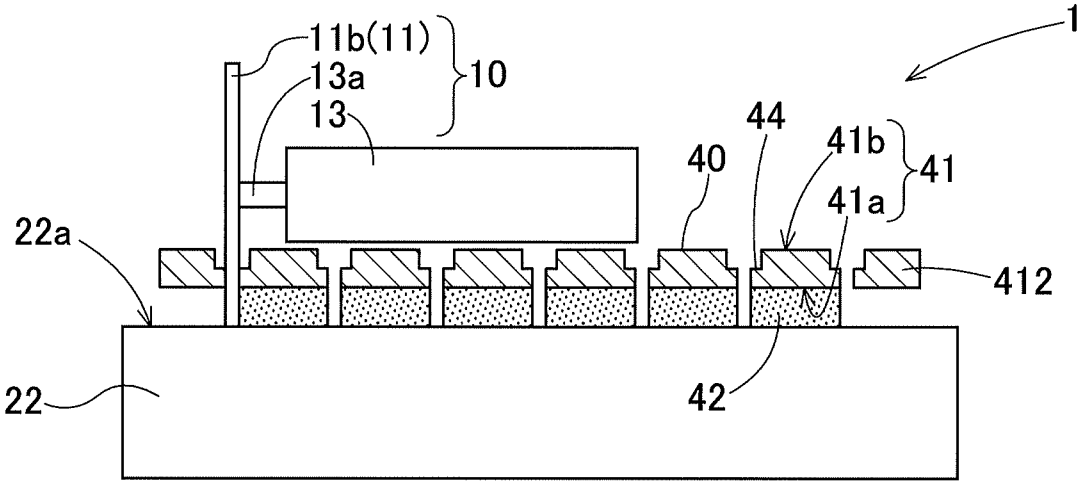


Fig.5C

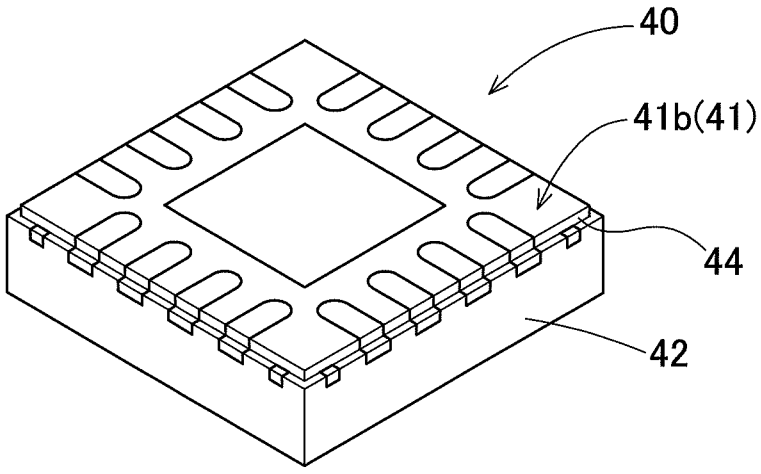


Fig.6

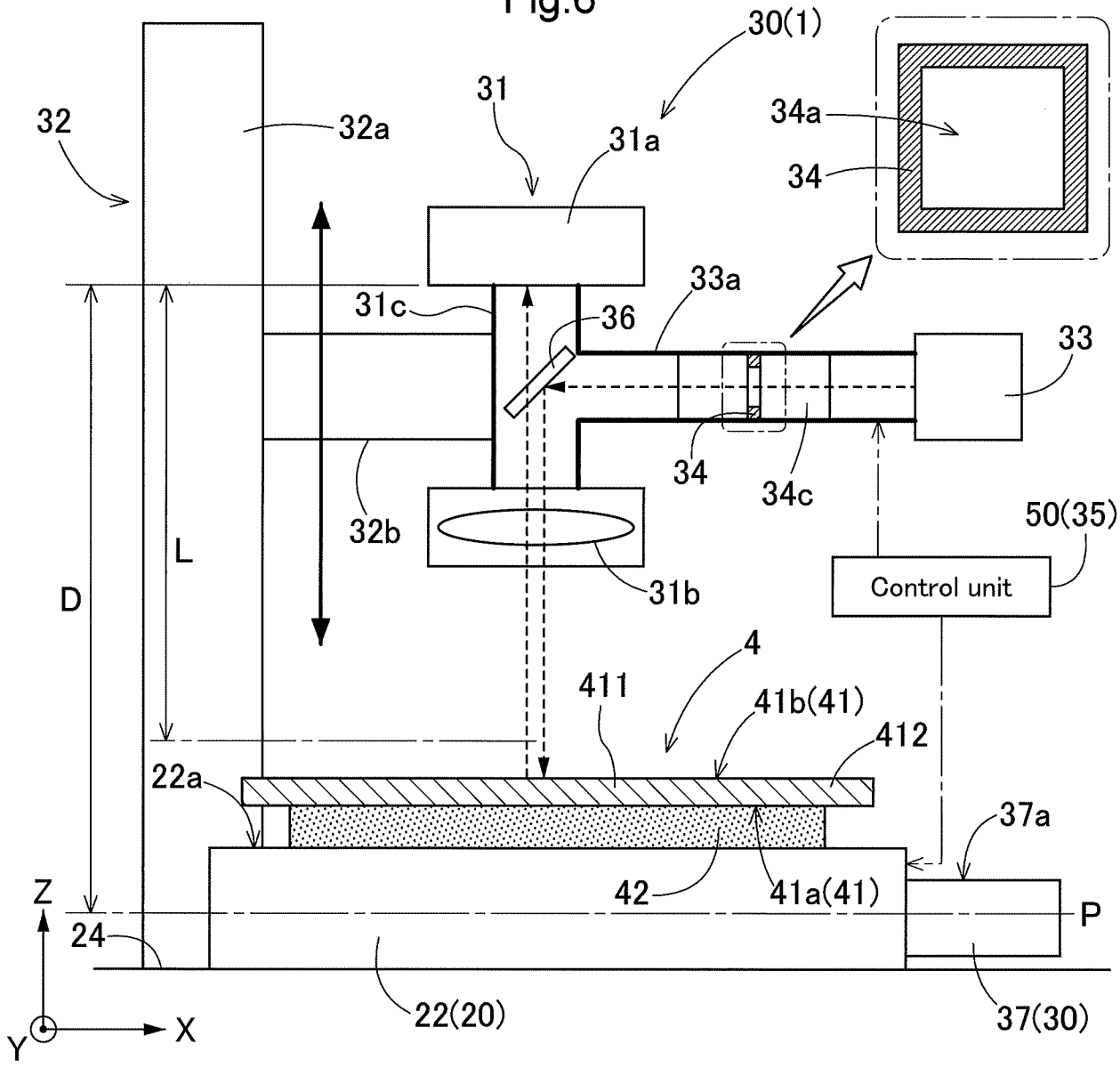

30(1)
31
32
32a
31a
34a
34
33a
31c
36
33
34
34c
32b
50(35)
L
D
Control unit
31b
4
411
41b(41)
412
22a
37a
42
41a(41)
Z
24
P
22(20)
37(30)
Y
X

Fig.7

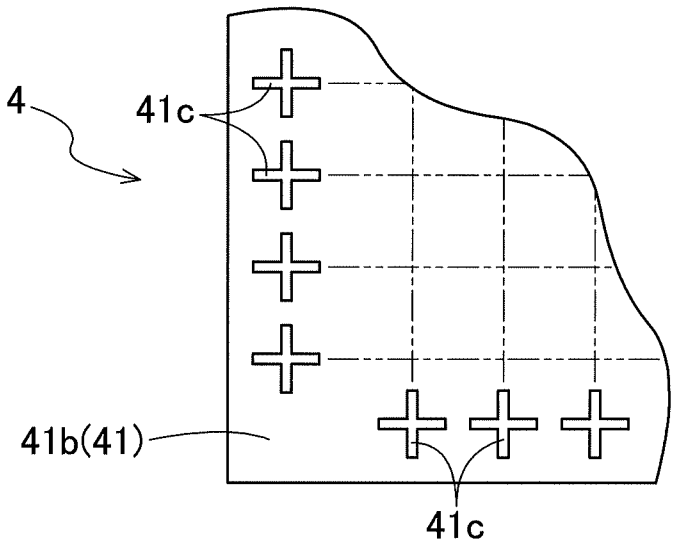

4
41c
41b(41)
41c

Fig.8

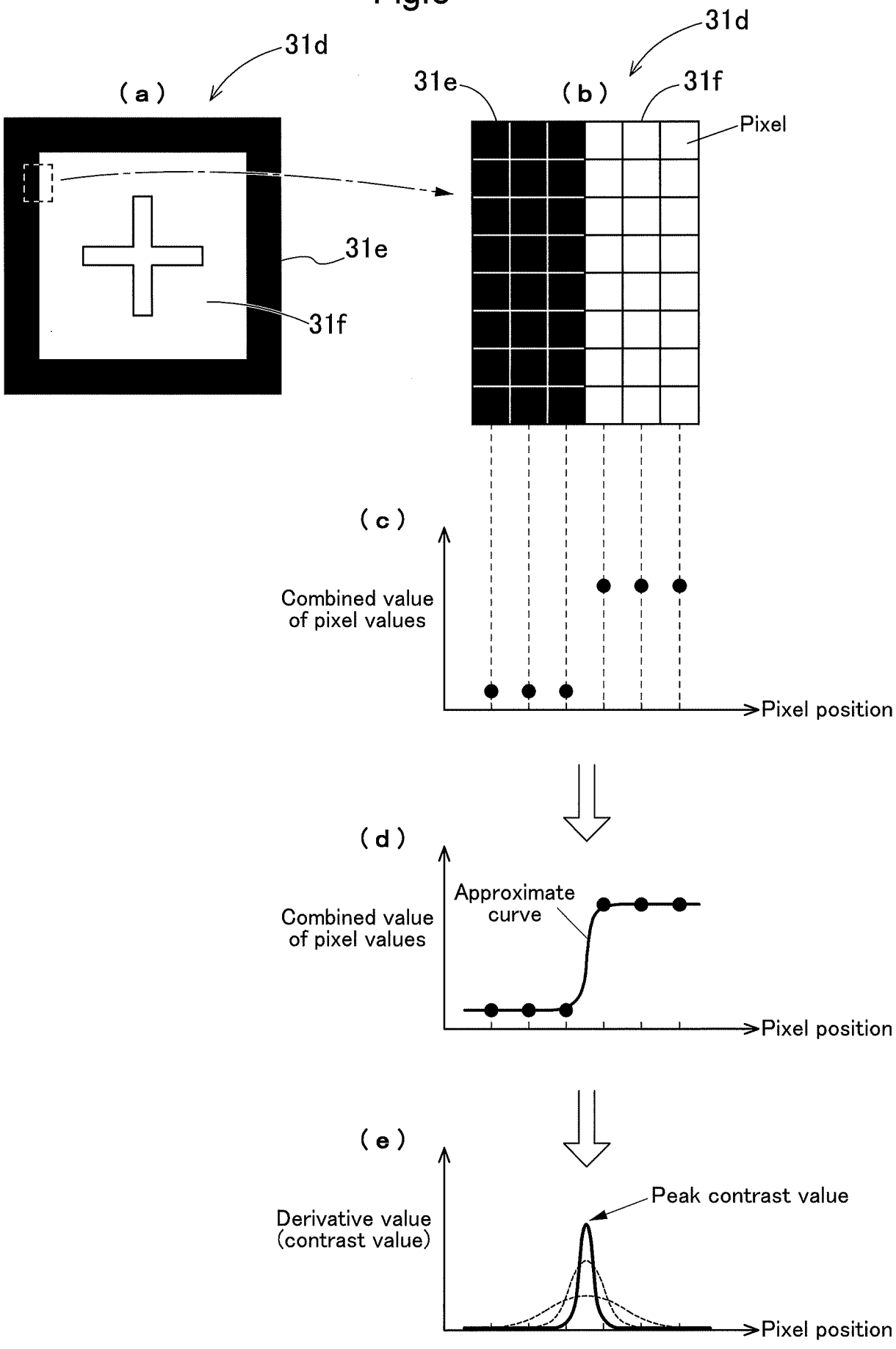

31d
(a)
31e
31f
31d
31e
(b)
31f
Pixel
(c)
Combined value of pixel values
Pixel position
(d)
Approximate curve
Combined value of pixel values
Pixel position
(e)
Peak contrast value
Derivative value (contrast value)
Pixel position

Fig.9

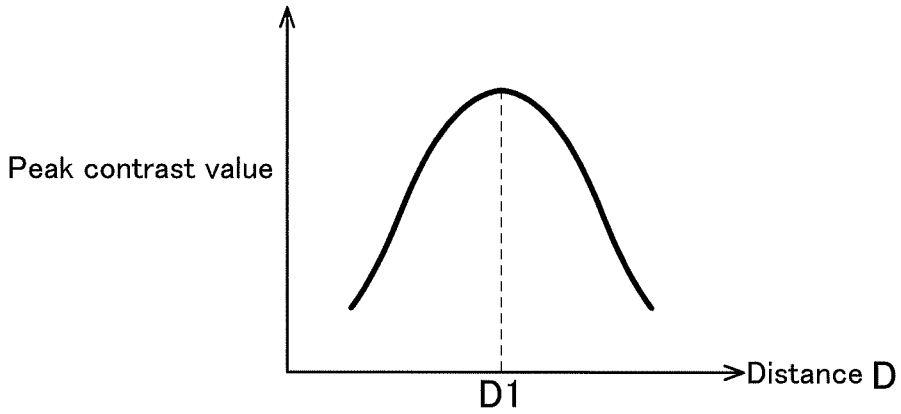

Peak contrast value
Distance D
D1

Fig.10

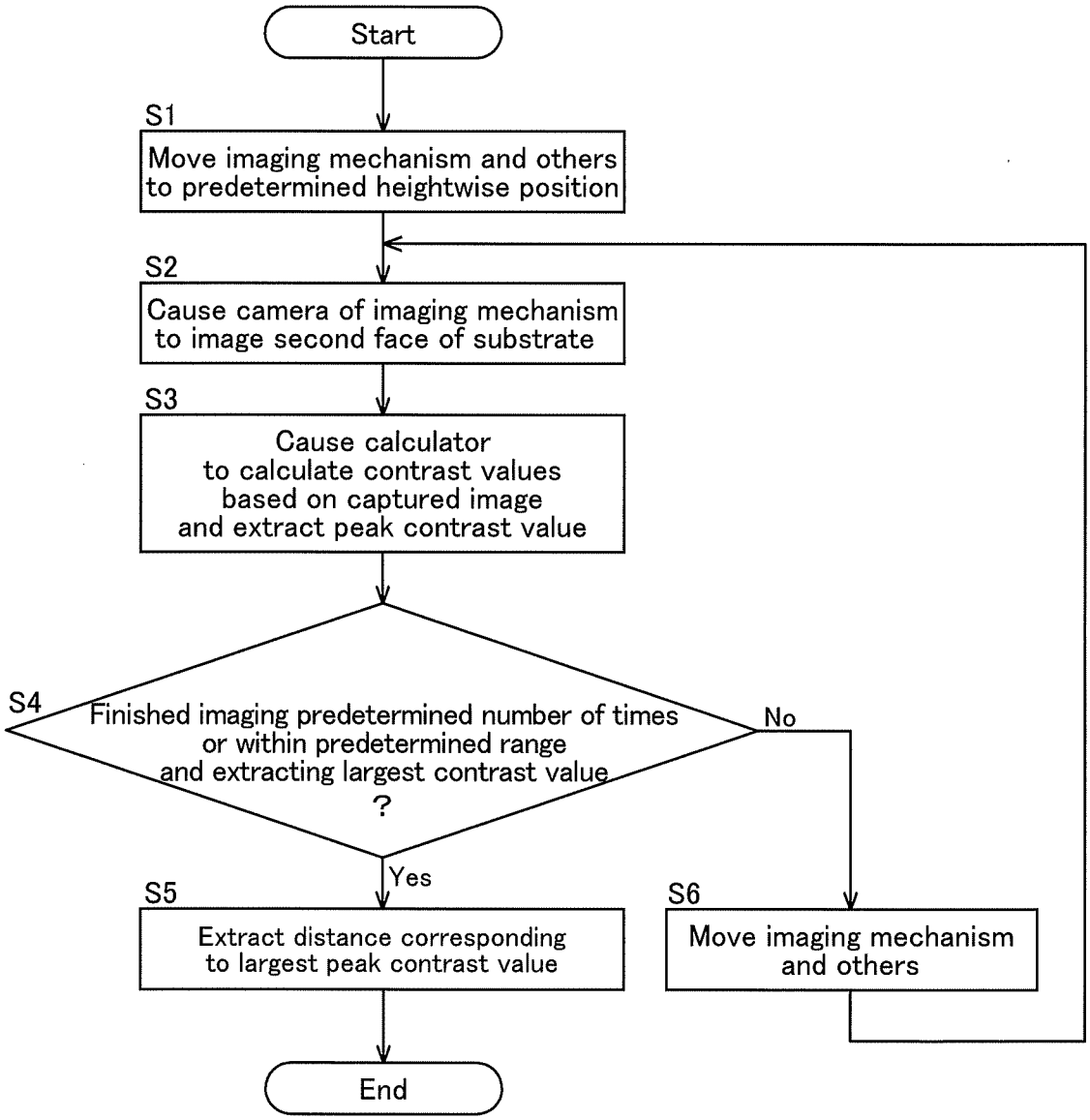
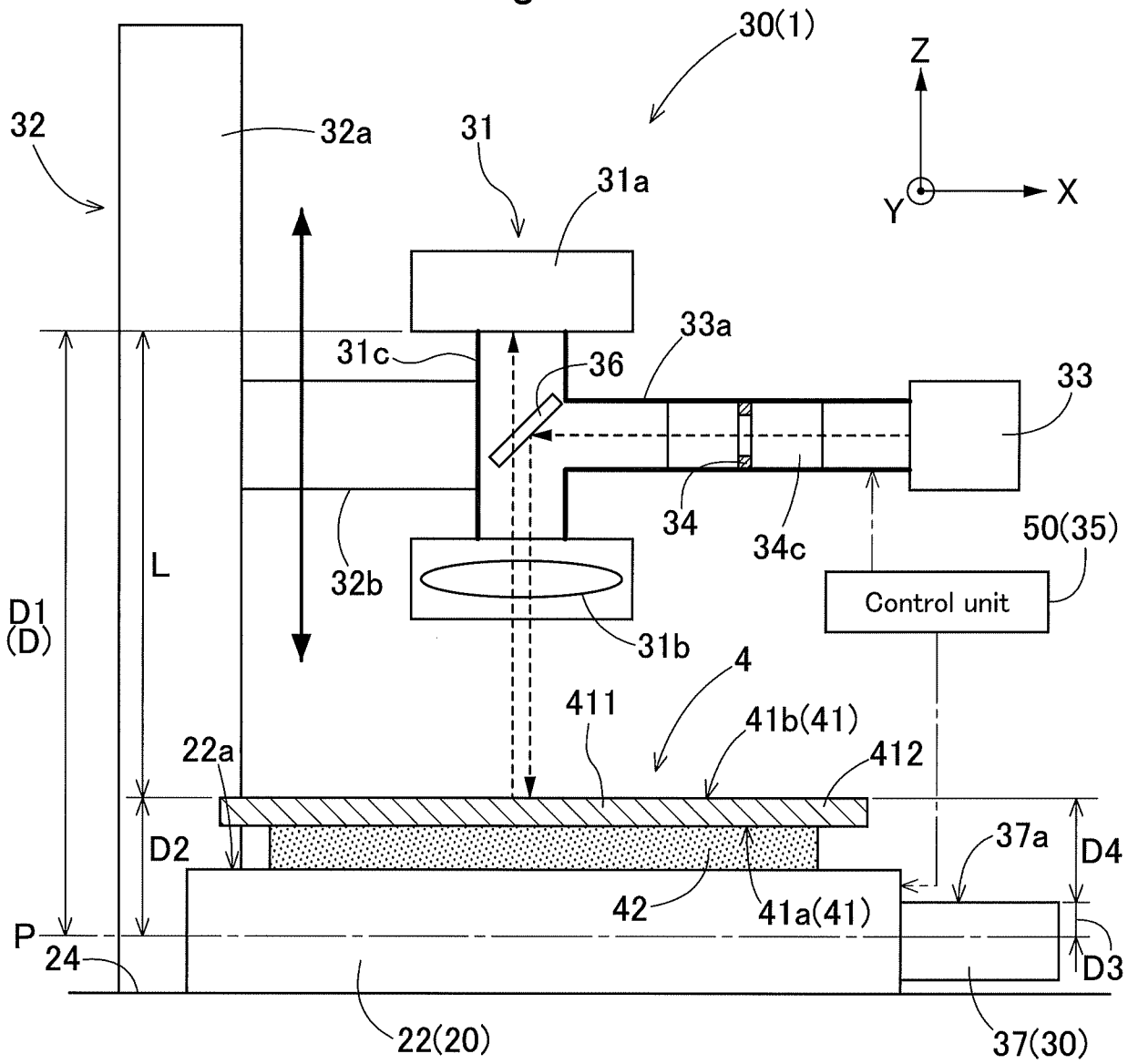

Start
S1
Move imaging mechanism and others to predetermined heightwise position
S2
Cause camera of imaging mechanism to image second face of substrate
S3
Cause calculator to calculate contrast values based on captured image and extract peak contrast value
S4
Finished imaging predetermined number of times or within predetermined range and extracting largest contrast value ?
No
Yes
S5
Extract distance corresponding to largest peak contrast value
S6
Move imaging mechanism and others
End

Fig.11


30(1)
Z
Y
X
32
32a
31
31a
31c
36
33a
33
34
34c
50(35)
Control unit
L
D1
(D)
32b
31b
4
411
41b(41)
412
22a
D2
37a
D4
42
41a(41)
P
24
D3
22(20)
37(30)